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AUTHOR Nelson, Charles A.
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ABSTRACT

Infants' responses to male and female faces and their preferences for happy versus fearful faces were studied to extend findings indicating that infants at 7 months can generalize discrimination between expressions of happiness and surprise across four different female models' faces. In the first experiment, a paired-comparison procedure was used in which 32 7-month-old infants were presented with three 30-second familiarization trials followed by two 10-second test trials. Half the infants were familiarized to happy faces and tested on fearful expressions; half were familiarized to fearful faces and tested on happy expressions. Observers recorded infants' looking times. Data from test trials were pooled, yielding one score for novelty and one for familiarity. Looking times were incorporated into an analysis of variance comparing happy-to-fear versus fear-to-happy groups and novel versus unfamiliar stimulus. A second experiment with 7-month-old infants examined whether a relative looking preference would emerge if infants were presented with a happy face paired with a fearful face. Overall, results suggested that (1) infants perceive facial expressions of happiness and fear in a categorical fashion, although their doing so depends in part on the order of stimulus presentation; and (2) a relative looking preference for fearful faces exists when such faces are paired with happy faces. (RH)

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The Categorical Perception of Facial Expressions by 7-Month-Old-Infants

Charles A. Nelson

Institute of Child Development

and

Center for Research in Human Learning

University of Minnesota

Minneapolis, Minnesota 55455

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The Categorical Perception of Facial Expressions by 7-Month-Old-Infants

The human face plays a central role in parent-infant communication prior to the onset of language. For example, the face serves as the primary medium through which the infant learns about the caretaker's feelings and intentions. It is therefore not surprising that a great deal of attention has recently been directed toward understanding how infants perceive facial expressions. We now know, for example, that newborns are able to discriminate happy, sad, and surprise expressions (Field, Woodson, Greenberg, & Cohen, 1982); that 2-month-olds can discriminate happy from neutral expressions (Nelson & Horowitz, 1983); that 3-month-olds can discriminate surprise from happy (Young-Browne, Rosenfeld, & Horowitz, 1977) and happy from frown expressions (Barrera & Maurer, 1981) and that 4-month-olds can discriminate joy, anger, and neutral expressions (LaBarbera, Izard, Vietze, & Parisi, 1976). It should be noted, however, that in all these instances only a single model was used to display each of the facial expressions under consideration. It is therefore difficult to conclude whether infants were discriminating changes in facial expressions per se, vs. changes in isolated features of the face. A more exact test of whether it was truly facial expressions being discriminated would be to see if infants could <u>generalize</u> their discrimination of facial expressions across the faces of several individuals. This would help ensure that infants were indeed attending to the relevant dimension of expression and not simply to changes in isolated features, such as the position of the mouth or eyes. To date there have been two such tests. Nelson, Morse, and Leavitt (1979) reported that 7-month-old infants could generalize their discrimination of happy and fear expressions across 3 different female models' faces. It was also reported that

this discrimination was constrained by the order in which the stimuli were presented. That is, infants could discriminate the two expressions if they were first familiarized to happy faces, but not if they were first familiarized to fear faces. More recently, Caron, Caron, & Myers (1982) reported that it was not until 7 months that infants could fully generalize their discrimination of happy and surprise expressions across 4 different female models' faces.

On the basis of these two studies, then, it appears that by 7 months infants <u>are</u> responding to facial expressions in a categorical fashion. The goal of the work to be described today was to extend these findings to include both male and female faces, and to examine infants' preferences for happy vs. fear faces.

Experiment 1

In the first experiment 7-month-old infants were asked to generalize their discrimination of happy and fear expressions across 4 different male and female models' faces. An additional goal was to replicate the order effect originally reported by Nelson, Morse, and Leavitt (1979) - that is, that infants could discriminate fear from happy expressions but not happy from fear.

Using a paired-comparison procedure, 32 7-month-old infants were presented with 3 30 sec familiarization trials. Each familiarization trial consisted of identical color photographs of either a male or a female model posing the same happy or fear expression on both the left and the right sides of the screen. Following the familiarization phase infants were presented with 2 10 sec test trials, in which a fourth male or female model's face was seen posing the familiar expression on one side and the novel expression on the other. Two male and two female faces were used in all. These faces were selected from a set that had been previously judged by adults as being the most prototypical of happy and

fear expressions. Half the infants were familiarized to happy faces and tested on fear, while the other half were familiarized to fear and tested on happy. The order in which the 4 models was shown to the infants and the order in which the novel test stimulus was presented on the left vs. right sides on the two test trials was counterbalanced across subjects. Approximately 3 sec intervened between trials.

The infant was positioned on the parent's lap facing a screen onto which were projected the slides. When the infant was ready for testing, the room lights were turned off and the session began. Trained and reliable observers, blind to condition, recorded the infant's looking times.

Results

To analyze the results, the data from the 2 test trials were pooled, yielding one score for novelty and one for familiarity. The looking times were then incorporated into an ANOVA, comparing the two groups (happy to fear vs. fear to happy) and the novel vs. familiar stimulus. The results can be seen in figures 1 and 2. As you can see, only infants familiarized to happy faces and

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Insert Figures 1 and 2

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tested on fear evidenced discrimination; infants who saw the reverse did not. Additionally, there was no reliable decline in looking over the 3 familiarization trials to either the happy or fear faces.

Discussion

The primary finding of interest was that infants could generalize their discrimination of happy and fear expressions across both male and female models' faces. However, as was the case in the study reported earlier by Nelson, Morse & Leavitt (1979), this discrimination was constrained by the order in which the

stimuli were presented. This order effect appeared not to be due to differential habituation to the set of happy faces or fear faces. As can be seen from figures 1 and 2, across the 3 familiarization trials the looking times to happy and fear faces was comparable and in neither case showed any decline. Nevertheless, it is possible that the failure of infants to prefer the novel happy expression after having been familiarized to the set of fear faces could have been due to a differential looking preference for fear over happy faces. For example, if infants in general tend to look longer at fear faces over happy faces, then on test infants might attend more to the fear face, independent of which expression served as the familiarization stimulus. While there appeared to be no absolute looking preference for happy as compared to fear faces between groups (that is, when infants familiarized to happy were compared to those familiarized to fear), it became of interest to examine whether a relative looking preference would emerge if infants were presented with a happy face paired with a fear face. This was the goal of the second experiment.

Experiment 2

In the second experiment another group of 32 7-month-old infants was tested, using the same 4 models as before. Each infant was presented with 2 45 sec trials of a happy vs. fear expression posed by one of the four models used in Experiment 1. The left vs. right positions were reversed from trial 1 to trial 2, and infants were randomly assigned to view one of the four models. The same apparatus and setting were used as before.

Results

Looking times were used as a measure of the infant's tendency to look longer at happy or fear on each of the two trials, and for each of the four models. The results revealed that infants looked significantly longer to the

fear face of 3 of the 4 models on the first trial, but not on the second trial. These results can be seen in figure 3.

Insert Figure 3

Discussion

From the second experiment it appeared that infants initially looked longer at a fear face over a happy face, although this tendency seemed to abate after the first 45 sec of viewing.

What is most intriguing about this finding is that infants in the first experiment familiarized to fear faces looked no longer than infants familiarized to happy faces on any of the three familiarization trials. However, when infants had a choice between happy and fear faces, as they did in the second experiment, they appeared to look most at the fear face. It thus seems that a looking preference for fear faces only emerges when fear is paired with some other expression: In this case, happy. Why there was no absolute preference for fear is not clear. If this finding can be replicated, however, one might speculate that the failure of infants in the first experiment to prefer the novel happy expression after having been familiarized to fear faces could have been due to a continued and sustained interest in fear faces. It is interesting to note that this same pattern of results has now been reported in three separate experiments, with the range of exposure time to fear faces being as little as 20 sec to a single fear face (Nelson, Morse, & Leavitt, 1979, Experiment 1) to the present 90 sec to three different fear faces. It might be of interest in future work to examine exactly how much exposure to fear faces is necessary to extinguish this preference. Using an habituation paradigm, for example, it might be predicted that infants would take longer to habituate to

fear vs. happy, and that the course of habituation (e.g., trials to criterion; length of looking on each trial) would differ between the groups. It would also be useful to extend this procedure to other expressions of emotion.

Overall, the present set of studies suggests that 7-month-old infants perceive happy and fear facial expressions in a categorical fashion, although their doing so depends in part on the order in which the stimuli are presented. It also appears that there is a relative looking preference for fear faces when fear is paired with happy. It is the subject of future work to determine whether this tendency to look more at fear vs. happy can be attributed to the relative novelty of fear expressions in the infant's environment; to some psychophysical difference that makes fear more salient; or to some sort of species-specific predisposition to "prefer" fear faces. While such preferences themselves could be interpreted as evidence of discrimination, they nevertheless do qualify the conclusions that can be drawn from discrimination data of the type reported today. It is suggested that future investigators take this matter into consideration.

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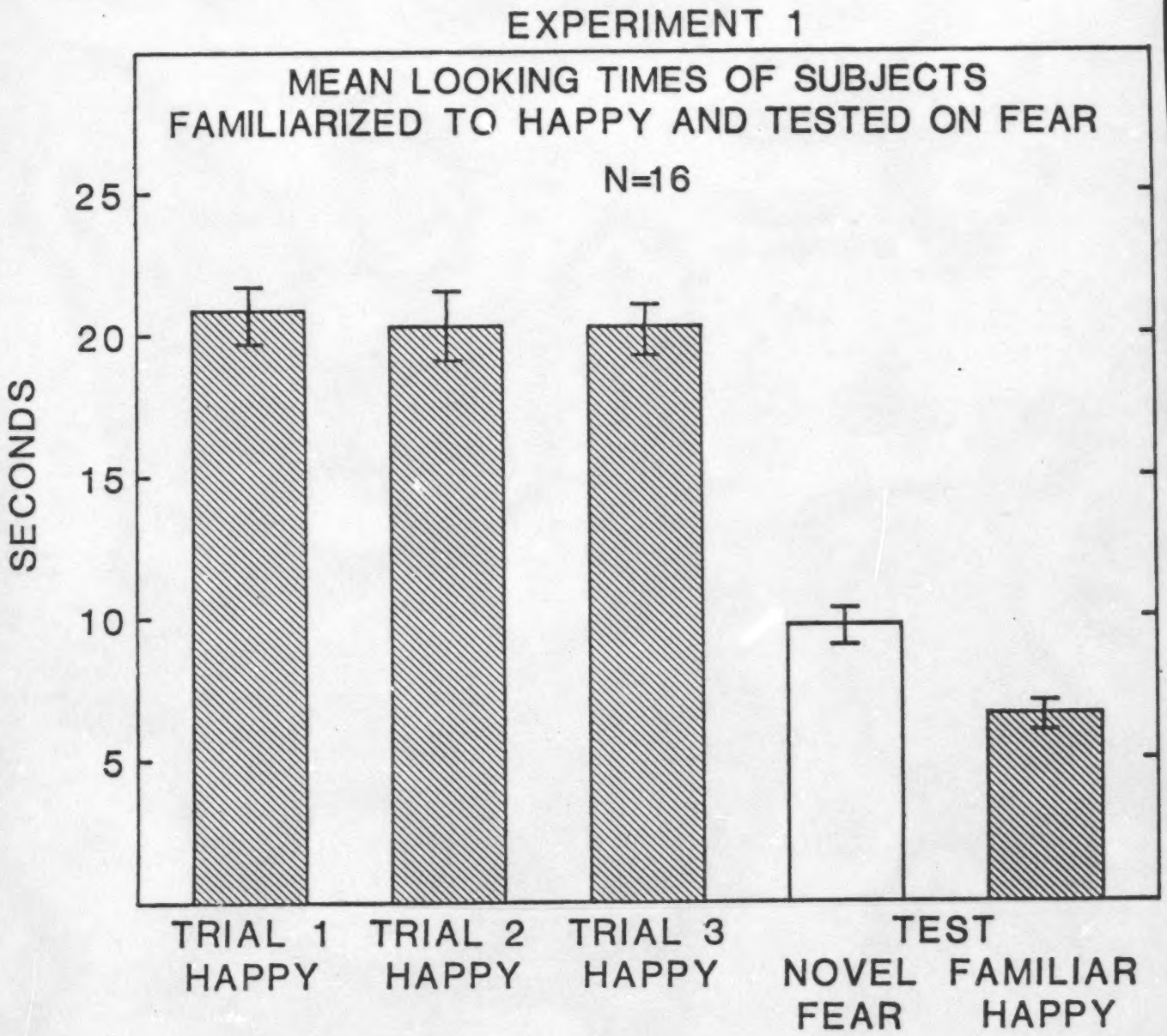
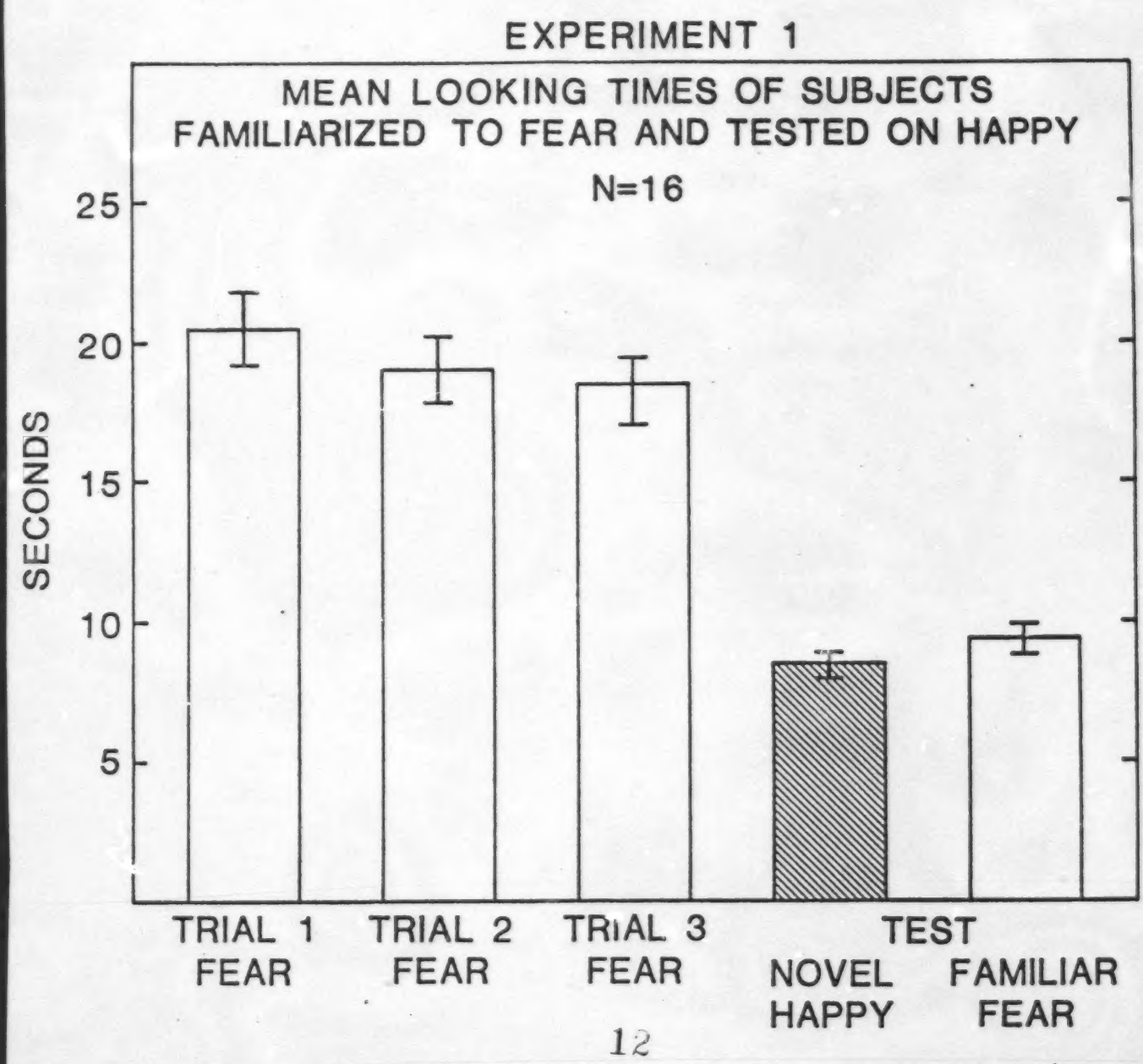
Figure Legends

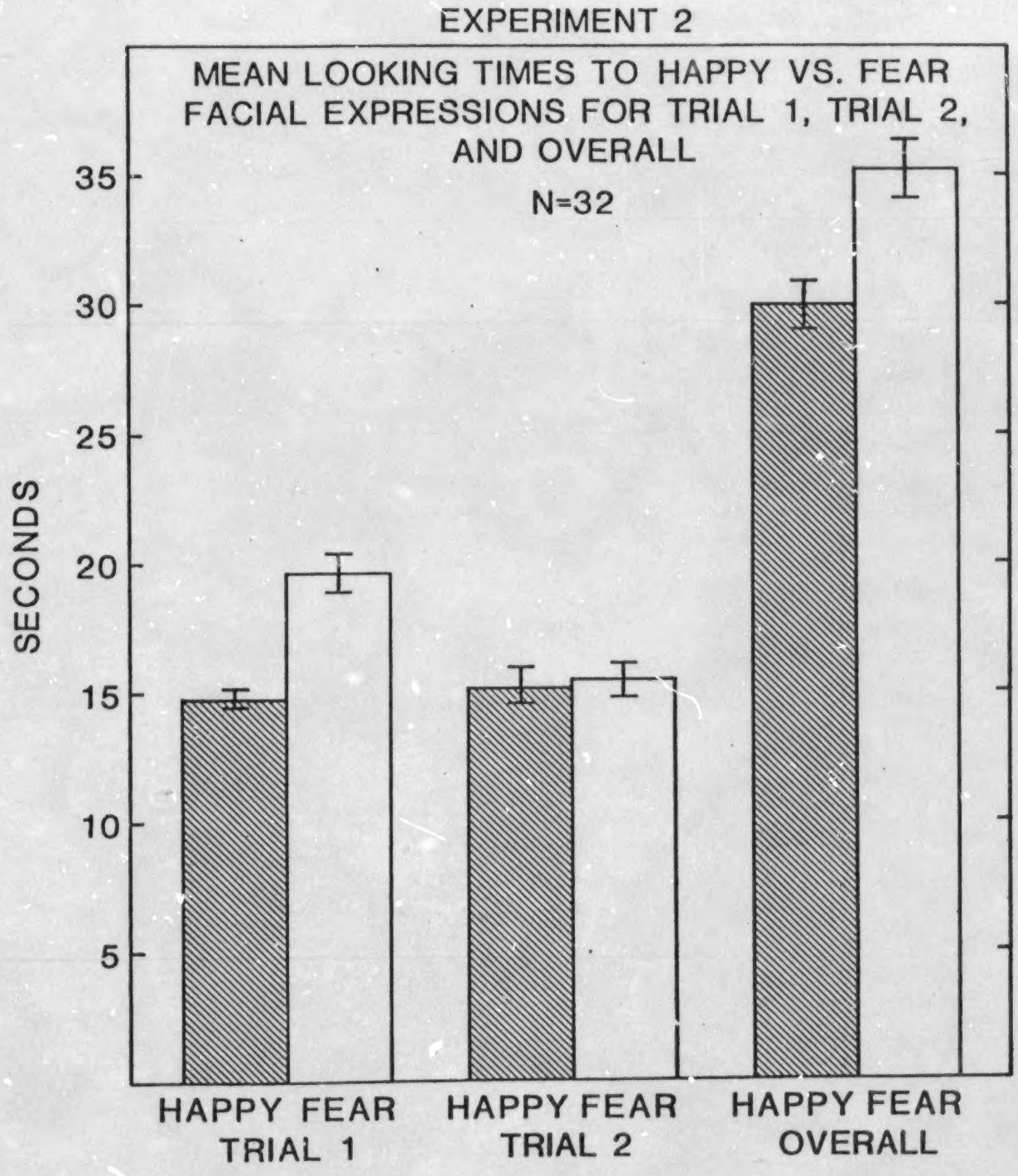
Figure 1. Looking times and discrimination data of infants familiarized to happy and tested on fear.

Figure 2. Looking times and discrimination data of infants familiarized to fear and tested on happy.

Figure 3. Infants' looking preferences for happy vs. fear faces on Trial 1, Trial 2, and overall (Trial 1 plus Trial 2). The data were collapsed across the four models.


EXPERIMENT 1
MEAN LOOKING TIMES OF SUBJECTS
FAMILIARIZED TO HAPPY AND TESTED ON FEAR
N=16
SECONDS
25
20
15
10
5
TRIAL 1
HAPPY
TRIAL 2
HAPPY
TRIAL 3
HAPPY
TEST
NOVEL
FEAR
FAMILIAR
HAPPY


EXPERIMENT 1
MEAN LOOKING TIMES OF SUBJECTS
FAMILIARIZED TO FEAR AND TESTED ON HAPPY
N=16
SECONDS
25
20
15
10
5
TRIAL 1
FEAR
TRIAL 2
FEAR
TRIAL 3
FEAR
TEST
NOVEL
HAPPY
FAMILIAR
FEAR


EXPERIMENT 2
MEAN LOOKING TIMES TO HAPPY VS. FEAR FACIAL EXPRESSIONS FOR TRIAL 1, TRIAL 2, AND OVERALL
N=32
SECONDS
35
30
25
20
15
10
5
HAPPY FEAR
TRIAL 1
HAPPY FEAR
TRIAL 2
HAPPY FEAR
OVERALL